

WHAT IS CLAIMED IS:

Sub 1
1. A semiconductor device comprising an insulating interlayer formed on a conductive film and including an insulating layer of a composition containing SiH,

wherein said insulating layer has an H content of not less than 15.4 atom% in the composition.

2. A semiconductor device comprising an insulating interlayer formed on a conductive film and including an insulating layer of a composition containing SiH,

wherein said insulating layer has an SiH content at which a degassing amount from said insulating layer abruptly decreases upon a slight change in the SiH content.

3. A device according to claim 1, wherein a contact hole for exposing part of a surface of said conductive film is formed, an interconnection layer electrically connected to said conductive film through said contact hole is formed, and said contact hole has a moderately tapered upper wall surface.

4. A device according to claim 2, wherein a semiconductor element is provided on a semiconductor substrate, and said conductive film is formed over said semiconductor element and electrically connected to said semiconductor element.

5. A device according to claim 1, wherein a semiconductor element is provided on a semiconductor

substrate, and said conductive film is formed over said semiconductor element and electrically connected to said semiconductor element.

6. A device according to claim 5, wherein said semiconductor element comprises a memory cell having an island-like floating gate formed on a tunnel insulating film on said semiconductor substrate, a control gate extending on a dielectric film on said floating gate, and a source and a drain formed in surface regions of said semiconductor substrate on both sides of said control gate, and

memory information is written and erased by controlling the amount of electrons in said floating gate.

7. A semiconductor device comprising a semiconductor element formed on a semiconductor substrate, and a multilayered interconnection structure formed over semiconductor element and electrically connected to said semiconductor element,

wherein said multilayered interconnection structure is an interconnection structure of at least two layers in which a conductive film or a lower interconnection layer and an upper interconnection layer formed on an insulating interlayer are electrically connected through a contact hole formed in said insulating interlayer,

said insulating interlayer includes an insulating layer of a composition containing SiH, and

047399
66622T-336E-460

said insulating layer has an SiH content at which a degassing amount from said insulating layer abruptly decreases upon a slight increase in the SiH content.

8. A semiconductor device comprising a semiconductor element formed on a semiconductor substrate, and a multilayered interconnection structure formed over semiconductor element and electrically connected to said semiconductor element,

wherein said multilayered interconnection structure is an interconnection structure of at least two layers in which a conductive film or a lower interconnection layer and an upper interconnection layer formed on an insulating interlayer are electrically connected through a contact hole formed in said insulating interlayer,

said insulating interlayer includes an insulating layer of a composition containing SiH, and

said insulating layer has an H content of not less than 15.4 atom% in the composition.

9. An insulating film formed on a conductive film and including an insulating layer of a composition containing SiH,

said insulating layer having an SiH content at which a degassing amount from said insulating layer abruptly decreases upon a slight increase in the SiH content.

10. An insulating film formed on a conductive

film and including an insulating layer of a composition containing SiH,

said insulating layer having an H content of not less than 15.4 atom% in the composition.

11. An insulating film formation method for an insulating interlayer to be formed on a conductive film and include an insulating layer of a composition containing SiH,

wherein said insulating layer is formed with adjusting its SiH content so that a degassing amount from said insulating layer abruptly decreases upon a slight increase in the SiH content.

12. An insulating film formation method for an insulating interlayer to be formed on a conductive film and include an insulating layer of a composition containing SiH, comprising the steps of:

applying a material film for said insulating layer; and

curing said material film with adjusting an SiH content in said material film to a predetermined value of not less than 50% an SiH content immediately after applying.

13. An insulating film formation method for an insulating interlayer to be formed on a conductive film and include an insulating layer of a composition containing SiH, comprising the steps of:

applying a material film for said insulating layer; and

curing said material film with adjusting an H content in the composition of said material film to a predetermined value of not less than 15.4 atom%.

14. A contact hole formation method, comprising the steps of:

in forming on a conductive film an insulating interlayer including an insulating layer of a composition containing SiH, forming said insulating layer with adjusting its SiH content so that a degassing amount from the insulating layer abruptly decreases upon a slight increase in the SiH content;

isotropically etching a surface layer of an upper insulating layer to form a recess having a moderately tapered wall surface on said surface layer; and

forming a contact hole which extends from said recess through said insulating interlayer to expose part of a surface of said conductive film.

15. A contact hole formation method, comprising the steps of:

in forming on a conductive film an insulating interlayer including an insulating layer of a composition containing SiH, forming said insulating layer by applying a material film for said insulating layer, and then curing said material film with adjusting an SiH content of said material film to a predetermined value of not less than 50% an SiH content immediately after applying;

isotropically etching a surface layer of an upper

insulating layer to form a recess having a moderately tapered wall surface on said surface layer; and

forming a contact hole which extends from said recess through said insulating interlayer to expose part of a surface of said conductive film.

16. A contact hole formation method, comprising the steps of:

in forming on a conductive film an insulating interlayer including an insulating layer of a composition containing SiH, forming said insulating layer by applying a material film for said insulating layer, and then curing said material film with adjusting an H content in the composition of said material film to a predetermined value of not less than 15.4 atom%;

isotropically etching a surface layer of an upper insulating layer to form a recess having a moderately tapered wall surface on said surface layer; and

forming a contact hole which extends from said recess through said insulating interlayer to expose part of a surface of said conductive film.

17. A method of manufacturing a semiconductor device which has a semiconductor element on a semiconductor substrate, and a multilayered interconnection structure over said semiconductor element, said structure being electrically connected to said semiconductor element, said method comprising the steps of:

forming said multilayered interconnection structure into an interconnection structure of at least two layers in which a conductive film or a lower interconnection layer and an upper interconnection layer formed on an insulating interlayer are electrically connected through a contact hole formed in said insulating interlayer; and

forming at least one insulating layer to constitute said insulating interlayer, by applying a material film of a composition containing SiH, and then adjusting its SiH content so that a degassing amount from the insulating layer abruptly decreases upon a slight increase in the SiH content.

18. A method of manufacturing a semiconductor device which has a semiconductor element on a semiconductor substrate, and a multilayered interconnection structure over said semiconductor element, said structure being electrically connected to said semiconductor element, said method comprising the steps of:

forming said multilayered interconnection structure into an interconnection structure of at least two layers in which a conductive film or a lower interconnection layer and an upper interconnection layer formed on an insulating interlayer are electrically connected through a contact hole formed in said insulating interlayer;

and

forming at least one insulating layer to constitute said insulating interlayer, by applying a material film of a composition containing SiH, and then curing said material film with adjusting an SiH content of said material film to a predetermined value of not less than 50% an SiH content immediately after applying.

19. A method of manufacturing a semiconductor device which has a semiconductor element on a semiconductor substrate, and a multilayered interconnection structure over said semiconductor element, said structure being electrically connected to said semiconductor element, said method comprising the steps of:

forming said multilayered interconnection structure into an interconnection structure of at least two layers in which a conductive film or a lower interconnection layer and an upper interconnection layer formed on an insulating interlayer are electrically connected through a contact hole formed in said insulating interlayer; and

forming at least one insulating layer to constitute said insulating interlayer, by applying a material film of a composition containing SiH, and then curing the material film with adjusting an H content in the composition of said material film to a

predetermined value of not less than 15.4 atom%.

Ans 3

09473988 122999